

NON-PUBLIC?: N
ACCESSION #: 9007180022
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Davis-Besse Unit No. 1 PAGE: 1 OF 04

DOCKET NUMBER: 05000346

TITLE: Reactor Trip from 73 Percent Due to Spurious RCP Monitor Circuit
Signal

EVENT DATE: 01/26/90 LER #: 90-002-01 REPORT DATE: 07/10/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 073

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Jan C. Stotz, Engineer - TELEPHONE: (419) 321-7544
Maintenance Planning

COMPONENT FAILURE DESCRIPTION:

CAUSE: X SYSTEM: CB COMPONENT: ISV MANUFACTURER: V085
X SB RV D243

REPORTABLE NPRDS: Y
Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

On January 26, 1990, at 0846 hours, during performance of Surveillance Test DB-MI-03205, RCP Current Monitor Inputs to SFRCS ACH1 and RPS Channel 1, the Station experienced a reactor trip from 73 percent full power. Prior to the trip, the Station had been operating with three of the four RCPs running. Plant response to the trip was normal with key parameters remaining in the normal post-trip band. Steam generator header pressure was intentionally reduced to approximately 970 psig to aid in fully reseating two main steam safety valves solidly. After stabilization of the plant, the Letdown Isolation Valve, MU2B, would not reopen. The inability to restore the letdown flow resulted in slower than normal plant cooldown and Mode 5 was achieved of January 27, 1990, at 0345 hours.

Immediate notification was made per 10CFR50.72(b)(2)(ii) on January 26, 1990, at 1007 hours. The reactor trip is reportable as an LER per 10CFR50.73(a)(2)(iv).

An action plan implemented to determine the cause of the RCP current monitor circuit transient concluded that there were two major factors. They were the inadequacy of the test switches to provide current isolation and the use of a standard isolation plug which results in unintended forces on the knife switch which carries the bypass current.

The cause of MU2B failure was determined to be thermal binding of the disc in the valve seat. The valve was replaced with a fully flexible wedge gate valve under MWO 2-89-0053-00. A similar failure occurred with RC-11, PORV Block Valve, during restart. It was replaced under MWO 1-90-1368-03.

END OF ABSTRACT

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Description of Occurrence:

On January 26, 1990, at 0846 hours, during performance of DB-MI-03205, Reactor Coolant Pump (RCP) Current Monitor to Steam and Feedwater Rupture Control System (SFRCS-JB) Channel 1 and Reactor Protection System (RPS-JC) Channel 1 Surveillance Test, the Station experienced a reactor trip from 73 percent thermal power. Prior to the trip, the Station had been operating with three of the four RCPs running. RCP 2-2 was shut down January 22, 1990, as a precautionary measure due to high indicated vibrations.

Plan

response to the reactor trip was normal. Steam Generator pressure was reduced to approximately 970 psig to aid in fully reseating two main steam safety valves (MSSVs). One of the valves that did not initially reseal fully was SP17A7, which also did not fully reseal after the January 18, 1989, event. The identification of the other MSSV that did not fully reseal is not known. After stabilization, the operators found that Letdown Isolation Valve, MU2B, would not reopen. The inability to restore letdown flow resulted in the need to decrease RCP seal injection to slow the rate of pressurizer level increase. RCP 2-2 (the shutdown RCP) seal return temperature increased when seal injection flow was reduced. This resulted in seal return flow being isolated from RCP 2-2.

The reactor trip (RPS actuation) is reportable under

10CFR50.73(a)(2)(iv). Immediate notification was made to the NRC via the Emergency Notification System (ENS) at 1007 hours on January 26, 1990, per 10CFR50.72(b)(2)(ii).

Mode 5 was achieved on January 27, 1990, at 0345 hours to start the Sixth Refueling Outage.

Apparent Cause of Occurrence:

The plant tripped when RPS sensed that reactor power was above the trip limit for operation with only one RCP running in each reactor coolant pump. RPS received a signal that indicated there was only one pump running in each loop because RCP 1-2 test restoration induced a current transient in the RCP current monitor circuit making it look like RCP 1-2 was off. With RCP 2-2 actually off and RCP 1-2 appearing to be off, RPS reduced the high flux/number of RCPs trip setpoint to approximately 55 percent of full thermal power as designed. Since the plant was operating at 73 percent, RPS Channel 2, 3, and 4 tripped causing a reactor trip. RPS Channel 1 did not trip because it had been placed in manual bypass per the test procedure. The trip occurred while restoring the test setup that functionally checks the high and low current setpoints for RCP 1-2. RCP 1-1 circuits had been similarly tested just minutes earlier without incident.

Subsequent testing and troubleshooting concluded that there are two major factors that can cause or contribute to a current transient. The first is the test switches used to bypass and then isolate the current monitor circuit under

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test. It does not provide sufficient, reliable means of maintaining signal continuity to the non-bypassed circuits during testing. The second contributor is the isolation plug which is inserted into the test switch during testing. It was noted that the plug could exert an unintended force on the knife switch which carries the bypass current. It was noted that with some repeatability the insertion/removal of the plug caused a current transient of sufficient magnitude to trip the current monitors in the other channels.

The cause of the MU2B failure was thermal binding of the valve disc in the valve seat. When the valve was closed during the trip, the flow through the valve stopped. The valve cooled relative to its temperature with flow. The rigid disc wedged into the seat as the valve cooled. When the operators later tried to open the valve, the stem pulled out of the disc.

Analysis of Occurrence:

There were no challenges to the Safety Features Actuation System (SFAS-JE) or the Steam and Feedwater Rupture Control System (SFRCS-JB). Key parameters remained in the normal post-trip band. Minimum RCS pressure was 1790 psig and maximum was 2175 psig. Steam generator pressures ranged from a maximum of 1076 psig to a minimum of 970 psig on SG 1-1 and maximum of 1053 psig and minimum of 970 psig on SG 1-2. The transient from 73 percent would be expected to be less severe than a transient from 100 percent thermal power.

The MSSVs not fully reseating did not significantly affect proper SG pressure response as pressure was being controlled at approximately 1025 psig immediate post-trip. The operators lowered turbine header pressure to approximately 970 psig to fully seat the two MSSVs solidly.

Corrective Action to Prevent Recurrence:

Additional shorting devices that already exist upstream of the test switch will be used to keep open circuit disturbances at the test switch from inducing transients to the current sensed by the other (non-bypassed) monitor circuits. This will be accomplished by a change to procedures DB-MI-03205 through 03208. These changes will be completed prior to their use for testing during three RCP operation.

The standard isolation plug has been replaced with an isolation tool consisting of a single piece of insulating material. This will minimize the disruptive forces exerted in this test switch during insertion/removal. The new isolation tool has been successfully used during troubleshooting. Its use during this testing will also be proceduralized by the change to DB-MI-03205 through 03208.

Previously scheduled inspections and maintenance were performed on the MSSVs this outage.

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MU2B has been replaced under MWO 2-89-0053-00 with a fully flexible wedge gate valve. The use of the fully flexible wedge should prevent further binding. A similar failure occurred with RC-11, the Pressurizer PORV Valve, during restart from the Sixth Refueling Outage. The valve was replaced under MWO 1-90-1368-03. Other similar uses of the solid wedge gate valves will be evaluated for the need to change to a design not affected by thermal binding.

Failure Data:

This is the first LER (since all reactor trips became reportable in January 1984) where RPS reduced the high flux/number of pumps trip setpoint even though there were actually three of four pumps running.

REPORT NO.: NP33-90-002 PCAQ NO.: 90-0036

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TOLEDO
EDISON

July 10, 1990 EDISON PLAZA
300 MADISON AVENUE
TOLEDO, OHIO 43652-0001

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United States Nuclear Regulatory Commission
Document Control Desk
Washington, D. C. 20555

Gentlemen:

LER 90-002, Revision 1
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence - January 26, 1990

Enclosed please find Revision 1 to Licensee Event Report 90-002. The changes are marked with a revision bar in the left margin. Please destroy or mark superseded any previous copies of this LER.

Yours truly,

Louis F. Storz
Plant Manager
Davis-Besse Nuclear Power Station

LFS/plf

Enclosure

cc: Mr. A. Bert Davis
Regional Administrator
USNRC Region III

Mr. Paul Byron
DB-1 NRC Sr. Resident Inspector

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